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ASTRONOMICAL OBSERVATIONS IN 1917

MADE BY TORVALD KÖHL, AT ODDER, DENMARK

VARIABLE STARS

(The instrument used is a 3-inch Steinheil, power 42.)

S *Ursae Majoris*[1]

Jan. 20: S < f, > g
28: 1 step < f
Feb. 12: 1 step < e
16: 2 steps < e
24: = e
Mar. 15: = d
27: 2 steps > d
31: 4 steps > d
Apr. 5: half-way between c and d
8: id.
May 16: = d
June 11: half-way between e and f
Aug. 12: = g
19: 2 steps < g
26: invisible
27: id.
28: id.
Sept. 6: > g, < f
Sept. 10: = f
12: = f[1]
15: 2 steps > f[1]
23: = e
Oct. 6: = d
15: 2 steps > d
17: 1 step < d
22: 2 steps > d
24: id.
Nov. 3: 3 steps > d
4: 1 step > d
15: 4 steps > d
Dec. 3: = d
4: 1 step > d
8: < d, > e
13: 1 step < e
18: = e
21: id.
28: id.

[1]Vide the sketch in the *Publications A. S. P.*, No. 73, **12**, 56

T *Ursae Majoris*[2]

Jan. 20: 1 step < a (in the sketch on S Urs.)
28: 2 steps < a (in the sketch on S Urs.)
Feb. 12: 4 steps > a
16: ½ step > a
24: 2 steps > a
Mar. 15: = c
21: < c, > d
27: ½ step > d
31: id.
Apr. 5: = d
8: half-way between d and e
May 16: 4 steps < g
Aug. 12: extremely faint
19: 5 steps < g
26: 2 steps < e
27: 1 step < e
28: = e
Sept. 6: 2 steps < c
10: half-way between b and c
12: = a
15: id.
Oct. 6: id.
15: id.
17: id.
22: < a, > b
24: = a
Nov. 3: < a, > b
4: id.
15: = c
Dec. 3: = d
4: id.
8: id.
13: half-way between d and e
18: 2 steps > e
21: ½ step > e

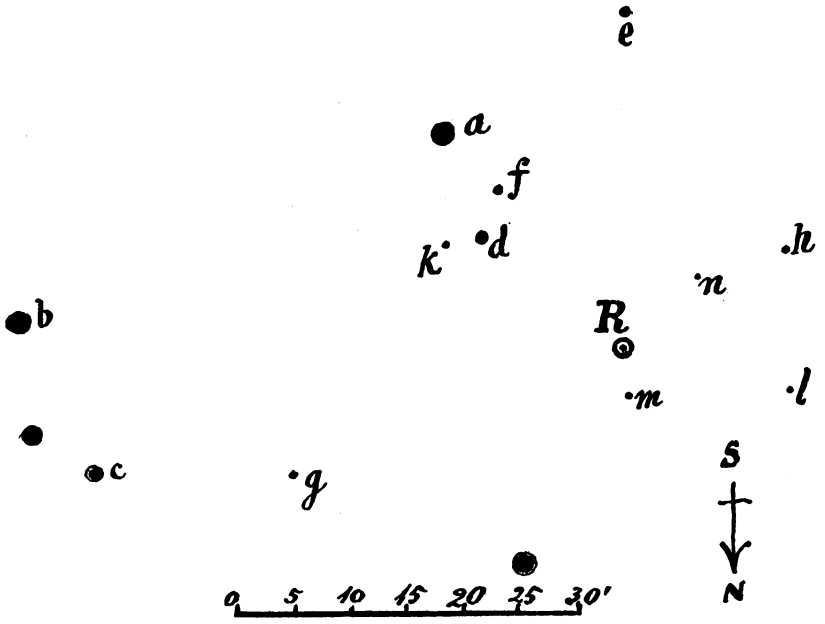
Var. 25, 1913, *Ursae Majoris*

(B. D. + 60° 1412 ($9^m.5$) = f in the sketch on T *Ursae Majoris*.)

Jan. 20: f ½ step > g
28: 2 steps > g
Feb. 12: 1 step > g
24: 2 steps > g
Mar. 15: id.
21: = g
27: 1 step > g
Apr. 8: 2 steps > g
e 5 steps > g
May 16: 1 step < g
Aug. 12: = g
19: id.
26: 2 steps < g
27: = g
28: d.
Sept. 6: id.
12: 2 steps > g
15: 1 step > g
Oct. 6: = g
15: 1 step < g
17: = g
22: id.
24: id.
Nov. 3: 1 step < g
4: = g
15: 1 step > g
Dec. 3: id.
4: id.
8: = g
13: 2 steps > g
18: = g
21: id.

[2]Vide the sketch in the *Publications A. S. P.*, No. 22, 4, 63.

R *Ursae Majori*



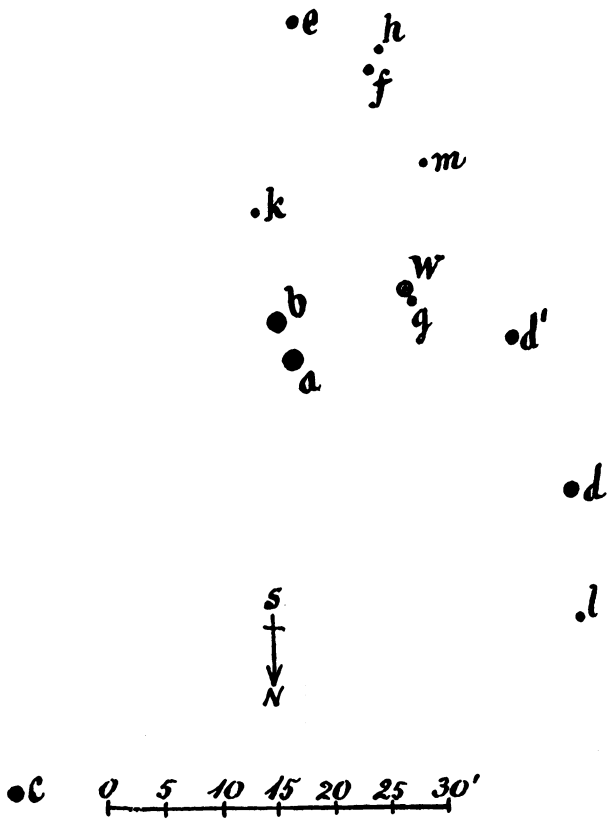
Aug. 19: R 4 steps > b	Oct. 22: = f
28: = b	24: 1 step < f
Sept. 6: id.	Nov. 3: = g
10: id.	15: = h
15: id.	Dec. 3: = m
Oct. 15: 2 steps > e	13: < m

S *Persei*[3]

Mar. 15: S $\begin{cases} < \text{d} \\ > \text{e} \end{cases}$	Sept. 6: $\begin{cases} < \text{e} \\ > \text{f} \end{cases}$
27: = e	10: =
Apr. 8: id.	15: id.
May 10: = f	Oct. 6: $\begin{cases} < \text{e} \\ > \text{f} \end{cases}$
Aug. 12: $\begin{cases} < \text{f} \\ > \text{g} \end{cases}$	17: id.
19: id.	22: id.
27: id.	

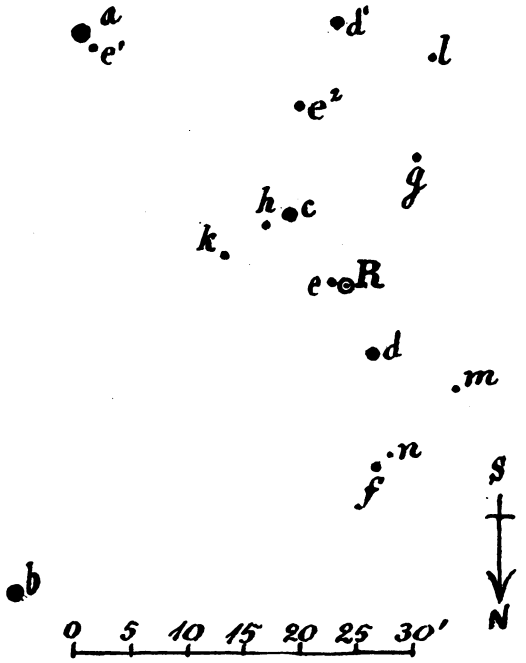
[3]Vide the sketch in the *Publications A. S. P.*, No. 135, **23**, 43.

W *Persei*



Sept. 10:	W = m	Oct. 24:	id.
15:	id.	Nov. 3:	id.
Oct. 15:	1 step > g	15:	1 step > g
22:	2 steps > g	Dec. 3:	2 steps > g

R *Aurigae*



Aug. 28:	R 2 steps > e	Oct. 22:	2 steps > b
Sept. 6:	half-way between d and e	24:	4 steps > b
		Nov. 3:	3 steps > b
10:	= d	15:	5 steps > b
15:	> d, < c nearest d	Dec. 3:	= c
		13:	= d
Oct. 15:	1 step > b		

Y *Tauri*

The comparison-stars have been

A = B. D. + 20° 1095 ($7^m.4$)
b = B. D. + 20° 1073 ($8^m.2$)

Jan. 20:	Y = A	Apr. 5:	1 step > A
28:	< A	Apr. 8:	½ step < A
Feb. 12:	= A	11:	id.
16:	1 step < A	16:	id.
24:	id.	Oct. 17:	= A
Mar. 15:	< A, > b	Nov. 15:	3 steps > A
		Dec. 3:	2 steps > A
27:	= A	13:	id.

U *Herculis*[4]

Apr. 18: U utmost faint	Sept. 6: id.
May 10: very faint	12: = e
16: id.	15: = d
Aug. 12: 2 steps < d	Oct. 6: 2 steps > f
19: = d	15: 2 steps < f
26: 2 steps > d	22: 3 steps < f
28: < c, > d	

SS *Cygni*[5]

Jan. 20, 7h: SS = h	May 10, 12h: = h
Feb. 12, 8h: < c, > d nearest d	16, 11h: = g
Apr. 18, 10h: 2 steps < c	Aug. 20, 9h: 1 step < d
21, 10h: 2 steps > d	26, 10h: id.
	27, 9h: 2 steps < d
	Sept. 6, 9h: 2 steps < h

R *Coronae*

Jan. 20: R invisible	Oct. 6: id.
Aug. 26: id.	15: id.
27: id.	22: id.
28: id.	Nov. 4: = f
Sept. 6: id.	15: = h
10: id.	Dec. 3: utmost faint
15: id.	4: 2 steps > h

[4]I have used the sketch in the *Publications A. S. P.*, No. 106, **18**, 52, but have added two small neighboring stars, g at a and h at f, both northward.

[5]Vide the sketch in the *Publications A. S. P.*, No. 141, **24**, 109.

W *Pegasi*[6]

Jan.	20:	W { < h, > n	Sept.	10:	1 step < f
				15:	{ < h, > k
Feb	12:	{ > h, < g	Oct.	6:	invisible
				15:	1 step < n
May	10:	1 step > b		22:	= n
Aug.	12:	= f	Nov.	4:	< n
	19:	= g		15:	a little < n
	26:	1 step > g	Dec	3:	id.
	28:	{ > f, < e		13:	id.
Sept	6:	id. but nearest e			

Several other stars, suspected for variation, have also been watched in the year 1917.

Large Meteors

Fireballs have been observed from stations in Denmark and surrounding countries on the following dates: January 23d, February 11th, 14th (four observations), 20th, 27th, March 1st, 18th, April 2d (two observations), 30th, May 8th, 9th (21 observations), 10th, 17th, June 10th, July 7th, August 8th, 14th, 22d, September 7th, October 28th, November 12th, 14th, 21st, December 4th, 13th, 18th, 19th, 29th.

Shooting-Stars

Shooting-stars were observed from six stations in Denmark and one in Schleswig from August 10-12 incl. At these stations 194 paths of shooting-stars were mapped, and, besides the fireball on May 9th, twelve proved suitable for calculation. These 13 meteors have given the following results:

FROM OBSERVATION

No.	Time, P. M.	Station	Beginning	Ending	Mag.	Observer
1	May 9, 11h 25m	Aarhus	20°+53°		©	M. Thomsen
		Copenhagen	80 +39		©	P. Bergsöe
2	Aug. 11, 11 18	Varde	31°+25°	24 +21.5	2	N. Bossen
		Ulderup	117 +55	136 +54	1	A. Bartram
3	Aug. 12, 10 16	Odder	261 +10	262 ÷ 7.5	1	J. Skakke
		Jyderup	244 +12.5	242 ÷ 2	1	M. Povlsen
4	Aug. 12, 10 21	Husby	322 +12	305 + 5	1	Rasmussen
		Jyderup[7]	257 +28.5	254.5+14.5	1	M. Povlsen

[6] Vide the sketch in the *Publications A. S. P.*, No. 141, **24**, 109.

[7] In Nos. 164 and 168 of these *Publications* read Jyderup instead of Tyderup.

FROM OBSERVATION—Continued

No.	Time, P. M	Station	Beginning		Ending		Mag.	Observer
5	Aug. 12, 10 57	Jyderup	321	+28.7	310	+19.5	2	M. Povlsen
		Copenhagen	280	+26.5	273	+16	4	Kierulff
6	Aug. 12, 11 1	Odder	337	+30	332	+22	2	J. Skakke
		Copenhagen	257	+38.7	254	+28	4	Kierulff
7	Aug. 12, 11 4	Husby	333	+29			3	Rasmussen
		Odder	264	+42			2	J. Skakke
8	Aug. 12, 11 9	Varde	66	+46	69	+43.5	4	N. Bossen
		Jyderup	169	+64	177	+56	3	M. Povlsen
9	Aug. 12, 11 10	Odder	243	+48	236	+33	2	J. Skakke
		Copenhagen	223	+31.5	222	+23	3	Kierulff
10	Aug. 12, 11 11	Husby	352	÷ 3			1	Rasmussen
		Varde	70	+48.5			4	N. Bossen
11	Aug. 12, 11 33	Odder	338	+11	332	+ 1	2	J. Skakke
		Copenhagen	288	+19	284	+ 6.5	3	Kierulff
12	Aug. 12, 11 47	Husby	342	+14.5	334	+ 9	2	Rasmussen
		Odder	304	+25	287	+17.5	2	J. Skakke
13	Aug. 12, 11 48	Nyborg	140	+69			1	T. Vaaben
		Copenhagen	205	+53			2	Kierulff

FROM CALCULATION

No.	Beginning.			Ending.			Real length of the path.	Radiant.	
	h	λ	φ	h	λ	φ	β	AR	Decl.
1				48.6	2° 1′.0	57° 18′.8			
2	33	2° 47′.8	55° 47′.5	27.1	3 3.5	55 40 .4	22.2	57°	+33°
3	166.5	4 17 .7	54 32 .4	85.8	3 55 .7	54 26 .1	85.1	255	+59
4	145.8	2 34 .5	55 8 .2	159.6	3 21 .2	54 35 .4	75	70	+18
5	95	0 39 .6	55 16	83.1	0 55 .9	55 8 .2	25.9	48	+44
6	115.9	1 17 .5	55 34 .9	98	1 28 .2	55 27 .1	25.8	44	+64
7	.....	.....	.....	114.6	3 21 .5	55 51	.....	.....	
8	95.6	1 53 .2	56 53 .5	71.8	2 8 .9	56 45 .9	31.2	40	+59
9	161.1	4 15 .3	56 12 .4	137	5 1 .2	56 1 .4	58.1	36	+33
10	.....	.....	.....	19.9	3 40 .7	55 58	.....	.....	
11	126.2	1 0 .8	54 55 .2	105.2	1 16 .8	54 39 .9	40	72	+59
12	144.3	2 52 .3	55 13 .4	110	3 27 .5	55 15 .6	51.6	13	+31
13	.....	.....	.....	116.4	1 57 .3	56 46 .3	.....	.....	

h and β are expressed in kilometers; λ is west longitude from Copenhagen; φ is north latitude; h is the altitude of the meteor above the Earth's surface.

The Carina-Meteor catalog has now reached the number of 6554 meteors, observed from stations in Denmark and surrounding countries from 1875 to 1917 inclusive.

From August 6th to 11th inclusive, astronomical lectures were held at the Carina Observatory in Odder.

In the estimation of variable stars, I have often been assisted by Mr. J. Skakke.